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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,826	08/20/2003	Hideki Kitao	031009	1825

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EXAMINER	
ECHELMEYER, ALIX ELIZABETH	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 05/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/604,826	KITAO ET AL.	
	Examiner	Art Unit	
	Alix Elizabeth Echelmeyer	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11-20-03, 4-5-05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Applicant's claim to foreign priority is acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US Patent Number 6,159,636) in view of Itagaki et al. (US Patent Number 6,767,671).

Regarding claims 1, 2, 7, 8, and 9 Wang et al. teach a lithium manganese oxide of spinel structure for use as an active material in a rechargeable lithium ion cell (column 2 lines 52-67). Wang et al. further teach that mixing the spinel with a nickelite such as $LiNi_{(1-x)}Al_xO_2$ will increase specific capacity, improve cyclability, and increase the safety of the lithium ion cell (column 3 lines 29-67). Wang et al. teach the use of carbonates such as propylene, ethylene, and diethyl carbonate.

Wang et al. teach the limitations of claims 1 and 7 except for the unsaturated cyclic carbonic acid ester of claim 1, specified as vinylene carbonate in claim 7.

Itagaki et al. teach mixtures of vinylene carbonate and propylene carbonate as the electrolyte solution because the mixture more sufficiently dissociates the electrolyte (column 10 lines 58-67; column 11 lines 1-10).

The combination of an unsaturated cyclic carbonic acid ester, such as vinylene carbonate, and a saturated cyclic carbonic acid ester, such as propylene carbonate, is desirable because the mixture more sufficiently dissociates the electrolyte.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the lithium ion secondary battery of Wang et al. with the electrolytic solution of Itagaki et al. because the mixture of Itagaki et al. would more sufficiently dissociate the electrolyte.

As for claims 2 and 8, Wang et al. teach the spinel structure of the lithium-manganese oxide and diethyl carbonate as the chain carbonate.

With regard to claim 3, Itagaki et al. teach the use of $LiMn_{1.9}Al_{0.1}O_4$ in the active material for the positive electrode.

Regarding claim 9, Wang et al. teach a negative electrode made out of carbon lithiated ions (column 2 lines 52-67), but fail to teach the specific electrode of the instant application.

Itagaki et al. teach the use of a surface treated carbonaceous material, such as graphite, because it is capable of occluding and discharging lithium (column 14 lines 31-50).

The use of graphite as the negative electrode active material is desirable because it is capable of occluding and discharging lithium.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use graphite as taught by Itagaki et al. in the negative electrode of Wang et al. because it is capable of occluding and discharging lithium.

3. Claims 10 and 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Itagaki et al. as applied to claim 1 above, and further in view of Mabuchi et al. (US Patent Number 6,156,432).

The teachings of Wang et al. and Itagaki et al. as described above are incorporated herein.

Wang et al. in view of Itagaki et al. fail to teach graphite coated with a layer of graphite having lower crystallinity than the base layer.

Mabuchi et al. teach a negative electrode for a lithium secondary battery made of graphite, which increases the charge/discharge capacity of the battery. Mabuchi et al. further teach coating that graphite layer with another layer of lower crystallinity carbon, which mitigates the fall in initial efficiency of the electrode due to the use of graphite.

The use of the lower-crystalline coating of Mabuchi et al. in the graphite negative electrode of Wang et al. and Itagaki et al. is desirable because it mitigates the fall in initial efficiency caused by the use of graphite.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to coat the graphite layer of Wang et al. and Itagaki et

al. with a lower crystalline carbon layer as taught by Mabuchi et al. in order to mitigate the fall in initial efficiency from the use of graphite as the negative electrode.

With regard to claim 11, Itagaki et al. teach that the intensity ratio of the surface treatment and the graphite of the negative electrode is (IA/IB) where IA is 1580-1620 cm^{-1} and IB is 1350-1370 cm^{-1} (column 15 lines 7-12).

4. Claims 4, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Itagaki et al. as applied to claim 1 above, and further in view of Suzuki et al. (US Pre-Grant Publication 2004/0072072).

The teachings of Wang et al. and Itagaki et al. as discussed above are incorporated herein.

Regarding claim 4, Wang et al. and Itagaki et al. fail to teach the use of a lithium-nickel composite oxide represented by the general formula $LiNi_cMn_dM3_{1-d}O_2$ wherein M3 is B, Mg, Al, Ti, V, Fe, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, wherein $0<c\leq1$ and $0.1<d$.

Regarding claim 5, Wang et al. and Itagaki et al. fail to teach the lithium nickel composite oxide described in the paragraph above wherein M3 is Co, Al, Mg, or Co.

Regarding claim 6, Wang et al. and Itagaki et al. fail to teach the lithium composite oxide of the general formula $LiNi_cMn_dCo_{1-d}O_2$, wherein $0<c<0.5$ and $0.1<d<0.6$.

Suzuki et al. teach the use of $Li_aMn_bNi_cCo_dO_e$, where $0.85<a<1.1$, $0.2<b<0.6$, $0.2<c<0.6$, $0.1<d<0.5$, and $1<e<2$. Use of this composition in the positive electrode

material of a lithium ion secondary battery reduces the amount of elution of the battery into the liquid electrolyte and enhances the stability at a high temperature (abstract).

Using the material of Suzuki et al. in the lithium ion secondary battery of Wang et al. and Itagaki et al. would be desirable because the material reduces the amount of elution of the battery into the liquid electrolyte and enhances the stability at a high temperature.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the lithium-nickel composite oxide of Suzuki et al. with the lithium ion secondary battery of Wang et al. and Itagaki et al. because the material of Suzuki et al. reduces the amount of elution of the battery into the liquid electrolyte and enhances the stability at a high temperature.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alix Elizabeth Echelmeyer
Examiner
Art Unit 1745

aee

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER